

Remarks

Claims 5 and 9 have been amended and new claims 21-22 have been added. Accordingly, claims 1-22 are currently pending.

I. Amendments:

Claims 5 and 9 have been amended merely to correct typographical errors. Accordingly, no new matter has been added.

New claims 21 and 22 depend from claims 1 and 17, respectively, and recite that the emulsifier is present in an amount sufficient to provide the resulting dispersion with a static storage stability of at least 5 weeks. Support for these claims can be found in the specification at page 2, lines 13-31; page 8, lines 18-21; and example 3. Again, no new matter has been added.

II. The Invention:

The present invention relates to an aqueous dispersion useful for internal or surface sizing, as well as preparation and use thereof in the production of paper. The aqueous dispersion includes at least one cellulose reactive sizing agent selected from the group consisting of ketene dimers and multimers, at least one cellulose non-reactive sizing agent, and at least one emulsifier selected from the group consisting of oxyalkylene phosphate esters and salts thereof, and oxyalkylene sulfate esters and salts thereof.

It has been found that effective internal and surface sizing can be achieved by using a dispersion comprising both a ketene dimer or multimer and a cellulose non-reactive sizing agent, and that high stability of such dispersions can be obtained by including a special kind of emulsifier, namely, an oxyalkylene phosphate ester or a salt thereof or an oxyalkylene sulfate ester or a salt thereof.

Examples 1 and 2 of the present application show that the present sizing dispersion gives considerably improved sizing efficiency than conventional internal or surface sizes. Examples 3 and 4 further show that the present sizing dispersion has improved stability and particle size distribution, due to the presence of the emulsifier, as claimed.

III. Rejections:

Claims 1 - 20 stand rejected under 35 U.S.C. § 103(a), as being obvious over Frolich et al. (US 6,306,255), in view of Wendel et al. (US 4,051,093). The Applicant respectfully traverses.

Frölich et al disclose a sizing composition comprising a cellulose-reactive sizing agent and a hydrophobically modified dispersing agent, and optionally a non-cellulose reactive sizing agent. Claim 1 of the present application is distinguished from Frölich et al by the presence of an emulsifier selected from the group consisting of oxyalkylene phosphate esters and salts thereof, and oxyalkylene sulfate esters and salts thereof, which has been found to solve the problem of providing a dispersion of high stability.

Wendel et al disclose a copolymer emulsion which may be used as a sizing agent for paper (column 6, lines 13-14; claim 1). Wendel et al disclose a number of conventional cationic, anionic, amphoteric and non-ionic emulsifiers (column 5, lines 2-24). Wendel et al do not disclose, teach or suggest a combination of a cellulose reactive sizing agent selected from ketene dimers or multimers and a cellulose non-reactive sizing agent.

The Office Action contends that, in view of Wendel et al, it would have been obvious to a person skilled in the art to use an emulsifier selected from the group consisting of oxyalkylene phosphate esters and salts thereof, and oxyalkylene sulfate esters and salts thereof in the dispersion of Frölich et al. Applicant respectfully disagrees and submits that one skilled in the art would not have any reason to use the emulsifiers in combination with the sizing agents, as claimed, based on the combined teachings of Frölich et al. and Wendel et al.

In that regard, Frölich et al suggest using any of a number of different emulsifiers with the cellulose-reactive sizing agent, with the proviso that the emulsifier has been hydrophobically modified, but none of which include the claimed emulsifiers. Similarly, Wendel et al suggest using any number of different emulsifiers in connection with performing the emulsion polymerization reaction to form the copolymer emulsion and teaches that a cationic emulsifier is preferred (See col. 5, line 4).

It is respectfully submitted that the cited references merely disclose the possibility of using any emulsifier selected from a broad range of different emulsifiers, as discussed above, without any suggestion to modify their teachings to arrive at the claimed invention. A "determination of obviousness cannot be based on the hindsight combination of components selectively culled from the prior art to fit the parameters of the patented invention." *Crown Operations*, 62 U.S.P.Q.2d at 1922 (quoting *ATD Corp. v. Lydall, Inc.*, 159 F.3d 534, 546, 48 U.S.P.Q.2d 1321, 1329 (Fed. Cir. 1998)). There must be a teaching or suggestion in the prior art, within the nature of the problem to be solved, or within the general knowledge of a person of ordinary skill in the

field of the invention, to look to particular sources, to select particular elements, and to combine them as combined by the inventor. *Id.* at 1922.

Applicant respectfully submits that, in order to obtain the dispersion as presently claimed, which includes using specific emulsifiers for the claimed dispersion (that includes the specific cellulose reactive and cellulose non-reactive sizing agents), one would have to pick and choose individual aspects from the various teachings in the cited references and then select the specific claimed emulsifier, in the absence of any teachings or suggestions to do so. It is respectfully submitted that the only way to accomplish this, is with the improper use of hindsight.

Although Frölich et al disclose a combination of a cellulose-reactive sizing agent and cellulose non-reactive sizing agent, Applicant respectfully submits that there is no teaching or suggestion that a dispersion of high stability could be obtained by selecting an emulsifier as presently claimed. It is further submitted that there is no guidance on how to select an emulsifier from among the thousands of emulsifiers known per se, including those mentioned in Wendel et al, in order to provide a stabile dispersion, as claimed.

Wendel et al disclose among other emulsifiers anionic emulsifiers such as alkyl sulfates, alkyl-sulfonates and alkyl-phosphates which may be in the in the form of adduct with ethylene oxide (column 5, lines 12-15). However, Applicant respectfully submits that there is no teaching or suggestion that oxyalkylene phosphate esters or salts thereof or oxyalkylene sulfate esters or salts thereof would be suitable for stabilizing a dispersion that includes both a ketene dimer or multimer and a cellulose non-reactive sizing agent.

Wendel et al teach that it is not necessary to have emulsifiers present in the process of emulsion polymerization in an aqueous medium containing conventional polymerization initiators to obtain shear-resistant emulsions (column 4, line 65- column 5, line 2). Wendel et al further teach that cationic emulsifiers are preferable, such as salts of fatty amines (column 5, line 4). However, Applicant has found that use of an emulsifier, as claimed, results in an unexpected improvement in stability of the dispersion compared to use of only a salt of a fatty amine. See Example 3, where use of a polyoxyethylene phosphate ester improved stability of the dispersion compared to using just a ditallow dimethyl ammonium chloride.

Applicant respectfully submits that neither Frölich et al nor Wendel et al, when read alone or in combination, disclose, suggest or teach that it would be possible or desirable to select an emulsifier, as presently claimed, for stabilizing a dispersion that includes both a ketene

dimer or multimer and a cellulose non-reactive sizing agent. Therefore, it is respectfully submitted that the presently claimed invention is not obvious in view of these cited references.

Accordingly, it is respectfully requested that the rejections of claims 1-20 under 35 U.S.C. § 103(a), as being obvious over Frolich et al., in view of Wendel et al., be withdrawn.

IV. Conclusion:

In light of the foregoing, Applicant respectfully submits that the application as amended, including claims 1-22, is now in proper form for allowance, which action is earnestly solicited. If the Examiner has any questions relating to this Amendment or to this application in general, it is respectfully requested that the Examiner contact Applicants' undersigned attorney at the telephone number provided below.

Respectfully submitted,



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